EVANS & PECK

24 September 2012

Executive Director
Infrastructure NSW
Level 15, 167 Macquarie St
Sydney NSW 2000

For the attention of Mr Christopher Swann

Dear Christopher

NSW Infrastructure Strategy – Review of Project Cost Assessments

Infrastructure NSW (INSW) is preparing its NSW Infrastructure Strategy which provides an overall strategy for infrastructure investment in NSW. The strategy includes a number of major infrastructure projects and programs, with an objective to improve performance in delivery of major projects.

As part of its strategy, INSW will provide an assessment of the potential cost and funding requirements for major capital investments. Evans & Peck has been requested by INSW to conduct a high-level review of the cost assessments for 11 of the major projects including major road, bus, light rail and heavy rail transport initiatives.

Evans & Peck's cost assessments are each described as a "scoping cost plan". This term has been coined to define an expected project cost to achieve the intended benefits, and recognising that there are many infrastructure projects which are desirable, but not at any cost.

In most cases, engineering solutions for the subject projects are not defined and it is not possible to make an assessment of costs with any precision. Rather than preparing "ground-up" estimates, we have sought to apply expert judgement in comparing the intended benefits with commensurate scope and costs observed in similar "reference" projects. In the context of the subject projects being considered, there are limited reference projects available and therefore the values are subject to further inaccuracy due to this small sample size.

In conducting our review, we have also taken into account NSW Government's objective to improve productivity in the delivery of infrastructure. The achievement of this objective may require changes to the way in which projects are delivered, particularly by challenging some current constraints and practices in order to develop and deliver lowest capital cost solutions that achieve the benefits sought.

Summary results of review

The results of Evans & Peck's review of the subject projects is summarised below, subject to further assumptions as set out in this letter and in Attachment 1. Expected costs are in real dollars as at 2012 and do not account for any escalation in values between the time of the report and the actual time of expenditure.

No	Subject project	Type of investment	Benefits	Assumed scope for benchmark costs	Exclusions	Real $M (2012, Exc GST)
	Motorway					
1	F6 extension	Major project	Quicker and more reliable travel time	33km dual carriageway motorway on surface in existing corridors	Tunnelling New Georges River bridge Property acquisition or compensation	2,600
2	F3 extension to Raymond Terrace	Major project	Quicker and more reliable travel time	19km dual carriageway motorway with new Hunter River crossing	Property acquisition or compensation	900
	Bus					
3	CBD underground bus rapid transit	Major project	Quicker and more reliable travel time, improved CBD amenity	850m of upgrade to existing tram tunnels and extension of tunnels from Wynyard to Town Hall. 2 new underground interchanges at Wynyard and Town Hall. Major civil project to connect tram tunnels to Sydney Harbour Bridge.	Property acquisition or compensation	1,800
4	Northern Beaches bus corridor improvement	Program	Quicker and more reliable travel time	Clip on lane to existing Spit Bridge, Operational improvements. Minor road-side works.	Property acquisition or compensation	200
5	Parramatta to Epping / Macquarie Park transitways	Major project	Quicker and more reliable travel time	20km transit-ways between Parramatta and Epping	Property acquisition or compensation Terminus works	400

No	Subject project	Type of investment	Benefits	Scope assumptions	Scope exclusions	Real $M (2012, Exc GST)
	Light Rail					
6	Anzac Parade Light Rail	Major project	Efficient public transport service to entertainment precinct and UNSW	7km new light rail on surface. 2 new stations.	Property acquisition Tunnelling solution	500
	Heavy Rail					
7	Mainline acceleration program pilot (Wollongong)	Program	Incremental improvement in travel time and proving of concept.	Operational improvements. Minimal project works.	Major civil or signalling works Rollingstock	100
8	Mainline acceleration program 1h express service Sydney-Wollongong and Sydney-Gosford	Program	Continued incremental improvement in travel time.	Allowances for civil works, passing loops and resignalling (or equivalent).	Major civil works Rollingstock	1,000
9	Mainline acceleration program to Newcastle	Program	Extension of previous program.	Extension of previous program.	Rollingstock	500
10	City Circle capacity improvements	Asset utilisation	Reduced passenger congestion on Town Hall and Wynyard stations	Major junction upgrade between Redfern and Central.	Station upgrades Rollingstock Stabling or resignalling.	1,000
11	Rapid transit services on core network Chatswood to CBD to Strathfield and Bankstown	Major project	Improved services in inner city areas (turn up and go).	120 additional single deck rollingstock sets. Re-signalling. Rail quadruplication between Chatswood and St Leonards. New twin rail tunnel from St Leonards to North Sydney	Station upgrades	5,000

Recommendations

In order to maximise the beneficial outcomes from infrastructure investment, Evans & Peck recommends the following:

1. *Establish intended benefits and control projects accordingly*: Prior to an investment decision, effort must be expended to clearly define the intended benefits and performance requirements so that the project solution can be aligned to the achievement of those benefits. Once this is done, appropriate governance and project control should be adopted so as not to embrace other desirable but potentially unjustified outcomes, such as unfunded social, environmental or economic benefits;

2. *Avoid optimism bias:* Another consideration is the avoidance of the widely reported "optimism bias" phenomenon which results in cost overruns and benefits shortfalls on major projects and is reported to be caused by various technical, psychological, economic and political drivers. There are a number of strategies to mitigate against this, including:
   - Designing smaller projects (including by delivery in bundled programs) that each have measurable benefits. Smaller projects will typically be less complex and have been reported to be less prone to cost overruns of benefit shortfalls than large projects;
   - Testing forecasts of project costs with the actual costs of comparable reference projects, and therefore avoiding the tendency for project planners and proponents to understate, overlook or ignore the so-called 'unplanned' events; and
   - Driving accountability in project outcomes including by setting achievable but challenging targets for projects and instilling governance arrangements that provide "guardianship" of project contingencies;

3. *Conduct detailed planning to prepare business cases*: In all cases, the projects require detailed planning and business case preparation. This may lead to changes in the recommended project prior to any decision to invest. Proven engineering solutions for the subject projects are not yet established, nor has Evans & Peck been able to verify the feasibility or otherwise of the proposed projects in any detail. Wherever possible we have highlighted the major hurdles (technical, social, environmental or otherwise) that we consider would need to be overcome in the development of a feasible business case for the subject projects.

No reliance

Evans & Peck has used all reasonable endeavours to inform itself of the parameters and requirements of the subject projects and has taken all reasonable steps to ensure that its review is as accurate as possible under the circumstances and in the limited time available. Evans & Peck does not accept any liability or responsibility arising in respect of any use or reliance upon any part of this advice by any party.

Yours faithfully

EVANS & PECK PTY LTD

Peter Trueman

Principal and Sydney Manager

Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 1 - F6 Extension
September 2012, Rev8

Item	Description	
Project Type	**Motorway**	
Reason for project	Missing links in Sydney's motorway network are slowing the performance of the overall network and contributing to congestion and delays. There is a largely preserved transport corridor which could be used to connect the existing F6 to the Sydney network.	
Intended benefits of project	As part of TfNSW's Congestion Management Program the F6 Extension will, when combined with other motorway network performance initiatives, enable quicker and more reliable journey times between Sydney and Wollongong on Sydney's strategic road network. This will link the Sydney Orbital to the Sutherland Shire and improve connectivity between southern Sydney, Wollongong and Port Kembla.	
Scope assumptions for benchmarking costs	33km dual carriageway motorway 2 lanes each way in urban areas. There are two elements: 1. Construction within existing reserved transport corridor from Marsh Street to Loftus; and 2. Upgrading the existing Princes Hwy to dual carriageway motorway standard, Loftus to Waterfall . The motorway will be connected to the existing Captain Cook Bridge across Georges River. All assumed as a surface solution - no tunnel.	
Scope exclusions	Property acquisition New bridge over Georges River Tunnelling	
Issues, risks and complexity factors	Acquisition of land including houses on, or immediately adjacent to the corridor. Potential loss in value and compensation to affected properties, businesses, community and land owners. Environmental and social concerns and constraints. The opportunity exists to stage the project to minimise community impacts, optimise cashflow and provide a progressive improvement in services.	
Total scoping cost plan $M excl. GST	Using benchmark based on published historical cost of a similar scale Sydney motorway project (M7) with adjustments made for consideration of relative complexity, escalated to 2012$	**$2,600**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 2 - F3 Extension to Raymond Terrace
September 2012, Rev8

Item	Description	
Project Type	**Motorway**	
Reason for project	Journey times between the F3 and the Pacific Highway to the east of Newcastle are adversely affected by the termination of the motorway before Tarro, the merging with traffic travelling east-west on the New England Highway and at grade junctions with urban roads.	
Intended benefits of project	Reduced journey times for traffic between the F3 and the Pacific Highway and between the New England Highway, Hunter Expressway and Newcastle. Reduced journey times for residents of Tarro to and from Newcastle.	
Scope assumptions for benchmarking costs	19.4km dual carriageway motorway, 2 lanes each way, connection south of Beresfield to southern side of Raymond Terrace. New Hunter River Crossing.	
Scope exclusions	Property acquisition	
Issues, risks and complexity factors	Project solutions have been considered although status not confirmed. Local communities at Tarro and Heatherbrae may welcome project as it creates a by-pass for F3/Pacific Highway traffic. Social and environmental concerns and constraints.	
Total scoping cost plan $M excl. GST	Benchmark based on published historical cost of similar regional motorway project (Kempsey Bypass), escalated to 2012$	**$900**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 3 - CBD underground bus Rapid Transit
September 2012, Rev8

Item	Description	
Project Type	**Bus**	
Reason for project	There is significant peak hour congestion of bus services in George St around Wynyard and Town Hall leading to unreliable bus services, general traffic congestion and reduced urban amenity from noise and pollution.	
Intended benefits of project	As part of a strategy to create a CBD transit spine, the benefits of dedicated tunnels and underground bus terminals at Wynyard and Town Hall would be reduced bus journey times, increased passenger comfort, and increased reliability for passengers travelling on inner west and Harbour Bridge services. It would also improve the urban amenity by removing buses from surface streets and reducing congestion for the remaining traffic. It is also likely to have a lower disruptive impact on the business and retail communities during construction compared to a light rail alternative.	
Scope assumptions for benchmarking costs	2x850m upgrade of existing tram tunnels. 900m new 2 lane tunnel between Town Hall and Wynyard. 2 new bus interchanges Town Hall and Wynyard. Restoration and reinvigration of York and George Street for improved pedestrian amenity.	
Scope exclusions	Property acquisition costs, compensation or benefits arising from development. Work to proposed Town Hall pedestrian plaza. New buses.	
Issues, risks and complexity factors	Location of the portal for the ramps into the Wynyard bus terminal and the connection between these portals and the Harbour Bridge will be complicated by the need to avoid conflicts with the alignments of the Western Distributor and the Cahill Expressway. Construction of the underground bus terminals and connecting tunnels in the CBD, particualrly due to existence of existing building foundations, basements and utilities. Design of the bus terminals will be complex due to the need to integrate with existing Wynyard and Town Hall rail station complexes. Upgrading the existing tram tunnels to modern day fire and life safety standards.	
Total scoping cost plan $M excl. GST	Benchmark based on published costs of Brisbane CBD busway project along with forecasts based on studies carried out for similar projects, escalated to 2012$	**1,800**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 4 - Northern beaches bus corridor improvement
September 2012, Rev8

Item	Description	
Project Type	**Bus**	
Reason for project	Bus services between the CBD and the Northern Beaches are often affected by congestion between the Spit Bridge and North Sydney. This is very acute in peak periods during the week and also at the weekends when the introduction of car parking zones reduces the available lane capacity.	
Intended benefits of project	Incremental improvements in journey times and reliability of bus services between the Northern Beaches and the CBD through a program of works along Military Road and the Spit Bridge to provide additional lane capacity and improved bus priority and junction flows.	
Scope assumptions for benchmarking costs	22.7km upgrades from Warriewood to Neutral Bay. Incremental operational improvements including road-side infrastructure and bus stops. New 'clip-on' extra lane to existing Spit bridge.	
Scope exclusions	Property acquisition or compensation costs	
Issues, risks and complexity factors	Property and land issues alongside Military Road to create dedicated bus lanesincluding potential compensation claims by businesses. Impacts of work in adjacent streets and intersections. Construction disruption to traffic along Military Road and adjacent streets.	
Total scoping cost plan $M excl. GST	Using benchmark based on historical cost of similar busway projects and forecasts from previous studies, escalated to 2012$	**$200**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 5 - Parramatta to Epping / Macquarie Park transitways
September 2012, Rev8

Item	Description	
Project Type	**Bus**	
Reason for project	Connectivity from Parramatta to the Epping area is currently poor. This limits access from Parramatta to employment opportunities in Macquarie Park and the rail links from Epping and Chatswood.	
Intended benefits of project	Reduced journey times to and from Parramatta to Epping, Macquarie Park, Chatswood, the Central Coast and North West Sydney.	
Scope assumptions for benchmarking costs	Approxmately 20km of dedicated busway corridor on existing road networks. Includes road-side infrastructure and bus stops.	
Scope exclusions	Property acquisition Additional structures Works at terminals (Epping and Parramatta)	
Issues, risks and complexity factors	Integration between a transitway and the existing road network. Intergation with existing facilities at Parramatta and Epping. Restructuring existing intersections and adjacent secondary roads.	
Total scoping cost plan $M excl. GST	Using benchmark based on historical cost of similar busway projects and forecasts from previous studies, escalated to 2012$	**$400**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 6 - Anzac Parade light rail
September 2012, Rev8

Item	Description	
Project Type	**Light Rail**	
Reason for project	The bus services in the corridor from Central to Moore Park and University of New South Wales suffer from traffic congestion, overcrowding, irregular service intervals and inadequate passenger waiting shelters. There is also poor customer information and a lack of on-the-ground management which further exacerbates these issues.	
Intended benefits of project	A direct public transport connection between Central and Moore Park/University of New South Wales for recreational and student passengers with sufficient capacity to meet peak loading demands without compromising the passengers' travel experience. Potential for improvements to general congestion.	
Scope assumptions for benchmarking costs	7Km of protected easement light rail within Anzac Parade. 2 new light rail stations.	
Scope exclusions	Property acquisition Tunnelling	
Issues, risks and complexity factors	Integration with the existing transport network. Requirement for space for terminus facilities at Central. Restructuring of existing road intersections. Disruption during construction. Defining operational and performance requirements accounting for high peak levels of demand and low baseline demand levels.	
Total scoping cost plan $M excl. GST	Using benchmark based on forecast costs of similar light rail project, escalated to 2012$	**$500**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 7 - Mainline acceleration program pilot (Wollongong)
September 2012, Rev8

Item	Description	
Project Type	**Heavy Rail**	
Reason for project	Passenger services between Sydney and the Central Coast, the Illawara and Newcastle currently only operate at an average speed of about 60km/hour. Opportunities exist to increase this to approximately 80km/hour, particularly by revising the balance-between reduced travel time and on-time running.	
Intended benefits of project	By taking a program management approach incremental benefits may be achieved in the short-term with minimal capital cost and disruption to the operational railway. The benefit of undertaking a pilot program of works between Sydney and Wollongong is to prove the concept and to provide the evidence for adopting it more widely across the network. This may support a longer term target to reduce travel times between Sydney to Gosford and Sydney to Wollongong to one hour.	
Scope assumptions for benchmarking costs	Conduct initial studies to prove and develop concept. Amendments to timetables for improved journey time. Potentially some minor projects to improve 'pinch points'.	
Scope exclusions	Any major civil works. Rollingstock - assumed no increase in frequency of services.	
Issues, risks and complexity factors	Identifying and prioritising the benefits from each initiative in the program and realising the benefits through incremental operational changes. Relatively high program management overhead and potential for sunk costs in investigations.	
Total scoping cost plan $M excl. GST	Allowance for studies to investigate feasibility, with sufficient allowance for operational changes and minor improvements through capital works.	**$100**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 8 - Mainline acceleration program 1hr express service (Wollongong & September 2012, Rev8

Item	Description	
Project Type	**Heavy Rail**	
Reason for project	Passenger services between Sydney and the Central Coast, the Illawara and Newcastle currently only operate at an average speed of about 60km/hour. Opportunities exist to increase this to approximately 80km/hour and thereby reduce journey times, particularly by striking a better balance between reducing travel time against on-time running performance.	
Intended benefits of project	Travel times from Sydney to Gosford and Sydney to Wollongong reduced to one hour. This may increase demand for services on these routes.	
Scope assumptions for benchmarking costs	Amendments to timetables for improved journey time. 2 passing loops or equivalent. 50km signalling upgrade or equivalent. Allowance for civil works projects or equivalent.	
Scope exclusions	Major rail realignment or capacity upgrade. Rollingstock - assumed no increase in frequency of services	
Issues, risks and complexity factors	Identifying and prioritising the benefits from each initiative in the program and realising the benefits through incremental operational changes and capital projects.	
Total scoping cost plan $M excl. GST	Allowance for potential scope based on costs from similar heavy rail projects, escalated to 2012$	**$1,000**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 9 - Mainline acceleration program Newcastle
September 2012, Rev8

Item	Description	
Project Type	**Heavy Rail**	
Reason for project	Passenger services between Sydney and the Central Coast, the Illawara and Newcastle currently only operate at an average speed of about 60km/hour. Opportunities exist to increase this to approximately 80km/hour and thereby reduce journey times, particularly by striking a better balance between reducing travel time against on-time running performance.	
Intended benefits of project	Further reductions in journey times for rail passengers travelling between Gosford and Newcastle.	
Scope assumptions for benchmarking costs	Amendments to timetables for improved journey time. Extension of previous schemes.	
Scope exclusions	Major rail realignment or capacity upgrade. Rollingstock - assumed no increase in frequency of services	
Issues, risks and complexity factors	Identifying and prioritising the benefits from each initiative in the program and realising the benefits through incremental operational changes.	
Total scoping cost plan $M excl. GST	Extension of previous schemes	**$ 500**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 10 - City Circle capacity improvements
September 2012, Rev8

Item	Description	
Project Type	**Heavy Rail**	
Reason for project	Trains crossing the Harbour Bridge experience significant congestion between Central and Wynyard due to passenger movement conflicts and platform space constraints at Wynyard and Town Hall stations. In contrast, the City Circle is relatively lightly used and stations such as St James and Museum is relatively low. The opportunity exists to utlise this latent capacity and relieve some of the congestion on the Harbour Bridge Line.	
Intended benefits of project	Reduce passenger congestion at Town Hall and Wynyard stations by increasing services and patronage to other City Circle stations. This may facilitate better services into the CBD, and potentially facilitate future service improvement through rapid transit service (single deck trains).	
Scope assumptions for benchmarking costs	Major junction upgrade between Redfern-Central.	
Scope exclusions	Station upgrades. Rollingstock. Timetabling adjustments. Provision of extra stabling capacity.	
Issues, risks and complexity factors	Ability to identify a feasible operational timetable with an increased frequency of service on the City Circle line, and identify an appropriate infrastructure solution that enables this. Cost reliability will be affected by the complexity of infrastructure works in Redfern-Central area whilst maintaining an operational railway. Cost efficiencies could be achieved through extending temporary possessions of some lines. Extent of station enhancement work at St. James and Museum is unknown and may be required to meet modern fire and escape standards for the increased passenger throughput.	
Total scoping cost plan $M excl. GST	Allowance for major junction upgrade based on actual costs and forecasts for similar heavy rail projects, escalated to 2012$	**$1,000**

Client: Infrastructure NSW (INSW)
Project: INSW Infrastructure Strategy
Attachment 1 - Cost Review
Item 11 - Rapid transit services on core network
September 2012, Rev8

Item	Description	
Project Type	**Heavy Rail**	
Reason for project	In some areas of the network close to the city there is the potential to cater for the forecast increase in passenger demand through the introduction of rapid transit services.	
Intended benefits of project	Provide turn-up-and-go metro style services. Single deck trains will have faster passenger boarding / disembarking and increase capacity compared to the double deck rolling stock. Resignalling will enable trains to run with shorter headways and an increased service frequency. An extension of rapid transit services would complement and leverage the benefits arising from the North West Rail Link.	
Scope assumptions for benchmarking costs	120 additional single deck train sets 100km Re-signalling Junction upgrade between Redfern-Central (included in item 10) 6km quadruplication between Chatswood-St Leonards 3km new rail tunnel St Leonards to North Sydney	
Scope exclusions	Station upgrades. Associated timetabling adjustments. Provision of extra stabling capacity.	
Issues, risks and complexity factors	Technical challenge to find an infrastructure solution that provides commensurate improvement in services compared to capital cost. Technical feasibility of increasing the number of trains per hour over the harbour bridge. The required infrastructure works in relation to signalling, track and stations will be highly complex to construct whilst minimising disruption to the operational railway. Possible need to upgrade Wynyard and Town Hall stations.	
Total scoping cost plan $M excl. GST	Dependent on infrastructure solution that meets proposed operational solution. Allowance made for potential scope based on actual costs and forecasts from similar heavy rail projects, escalated to 2012$	**$5,000**